Course unit title:	Vehicle Dynamics & Control II		
Course unit code:	AU402		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	7 (Fall)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Marios Lestas		
Learning outcomes of the course unit:	1. Know accident avoidance systems, driver assistance systems, latest anti lock braking systems and modern steering systems. 2. Numerically simulate a vehicle's lateral dynamics (with and without control systems) using Matlab or Carsim. 3. Analyse and compare electronic stability control systems and active steering systems. 4. Measure the lateral response of a vehicle using a data acquisition system, accelerometers and other dedicated equipment. 5. Design, as a group, an algorithm for identifying a vehicle's parameters.		
Mode of delivery:	Face-to-face		
Prerequisites:	AU303	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	• **Modelling vehicle's lateral motion:** know what Ackermann geometry is, sketch the tire force and slip angle characteristic, know tire models e.g. Pacejka, know how to model the vehicle for low speed turning, know how to model the vehicle for high speed turning, analyze under and over steering, compute the roll motion of a vehicle, know what a driver model is, analyze the stability of a vehicle, measure vehicle's response for lane change using a data acquisition system and accelerometers. • **Automotive control systems:** know, analyse and compare automotive control systems: i) Electronic stability systems, ii) Cruise control systems, iii) Anti lock braking systems. • **Vehicle systems and future developments:** know vehicle systems and their future developments: i) Steer by wire systems, ii) Roll over avoidance, iii) Clutch systems (e.g. DKG), iv) Transmission systems (e.g. CVT, electronic differential), v) Braking systems (brake by wire), vi) Intelligent transportation systems (e.g. autonomous navigation). • **Modelling and simualtion of vehicle transient cornering using Matlab or CarSim:** Individual or small group modelling performed with the use of common industrial packages such as Carsim and Matlab.		
Recommended and/or required reading:			
Textbooks:	J. Y. Wong, ***Theory of Ground Vehicles***, Wiley-Interscience, 4th edition, 2008 R. Rajamani, ***Vehicle Dynamics & Control***, Springer, 2nd Edition, 2012		
References:	T. D. Gillespie, ***Fundamentals of Vehicle Dynamics***, SAE International, 1992 W. F. Milliken, et al, ***Chassis Design: Principles and Analysis***, Society of Automotive Engineers, 2002. R. Bosch, ***Automotive Handbook***, Robert Bosch GmbH, ISBN: 0837612438 U. Kiencke, L. Nielsen, ***Automotive Control Systems: For Engine, Driveline and Vehicle***, Springer 2005		

	R. Bosch, ***Automotive Electrics/Automotive Electronics***, Robert Bosch GmbH, 2007 H. Pacejka, ***Tire and Vehicle Dynamics***, SAE International, 3rd Edition, 2012
Planned learning activities and teaching methods:	The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks. Furthermore, theoretical principles are explained by means of specific examples and solution of specific problems. Lectures are supplemented with the applications on computer software under the supervision of a lecturer. Here a demonstration of actual problems and computational methods takes place. Additionally, students are asked to apply their gained knowledge and identify the principles taught in the lecture sessions by means of working on different modelling tasks and evaluating simulation results.
Assessment methods and criteria:	• Assignments: 10% • Tests: 30% • Final Exam: 60%
Language of instruction:	English
Work placement(s):	No